CLAIMS

We claim:

1. A composition comprising:
   a) an analog probe; and
   b) a first recombinase coated single stranded nucleic acid probe.

2. A composition according to claim 1 further comprising a second recombinase coated single stranded nucleic acid probe which is substantially complementary to said first probe.

3. A composition according to claim 1 wherein said analog probe comprises peptide nucleic acid.

4. A composition according to claim 1 wherein said analog probe is a fusion sequence comprising nucleoside analogs and naturally occurring nucleosides.

5. A composition according to claim 4 wherein said nucleoside analog comprises at least one peptide nucleoside.

6. A composition according to claim 1 wherein said first single stranded nucleic acid probe is DNA.

7. A composition according to claim 1 wherein said recombinase is a species of a prokaryotic recombinase.

8. A composition according to claim 7 wherein said prokaryotic recombinase is a recA recombinase.

9. A composition according to claim 1 wherein said recombinase is a species of eukaryotic recombinase.

10. A composition according to claim 9 wherein said recombinase is a Rad51 recombinase.

11. A composition according to claim 9 wherein said recombinase is a complex of recombinase proteins.

12. A method comprising:

a) providing a sample comprising double stranded nucleic acid target sequence;
b) activating nucleic acid targeting using an analog probe; and
c) hybridizing to said double stranded nucleic acid target sequence at least a first recombinase coated single stranded nucleic acid probe comprising a homology clamp that is substantially complementary to one strand of said target nucleic acid sequence.

13. A method according to claim 12 further comprising a second recombinase coated single stranded nucleic acid probe, which hybridizes to said double stranded nucleic acid target sequence and is substantially complementary to said first recombinase coated single stranded nucleic acid probe.

14. A method according to claim 12 wherein at least one of said first and second probes comprises at least one alteration as compared to said target sequence, and wherein said method further comprises altering said target sequence by homologous recombination with at least one of said probes.

15. A method according to claim 14 wherein both first and second recombinase coated single stranded nucleic acid probes have said alteration.

16. A method according to claim 14 wherein said alteration comprises a substitution mutation of at least on nucleic acid.

17. A method according to claim 14 wherein said alteration comprises a deletion mutation of at least on nucleic acid.

18. A method according to claim 14 wherein said alteration comprises an insertion of said at least one nucleic acid.

19. A method according to claim 12 wherein said activating analog probe creates a nucleation site for hybridization of said first recombinase coated single stranded nucleic acid to said nucleic acid target sequence.

20. A method according to claim 19 wherein said nucleation site is a D-loop structure.

21. A method according to claim 20 wherein said D-loop structure is either a single or a double D-loop structure.

22. A method according to claim 19 wherein said activating analog probe forms a hybridization complex with some portion of said nucleic acid target sequence.

23. A method according to claim 22 wherein said hybridization complex is at least as stable as a non-analog nucleic acid hybridization complex.

24. A method according to claim 12 wherein said activating analog probe facilitates the production of double stranded gaps in the target nucleic acid sequence which are repaired by said recombinase coated single stranded nucleic acid probes.

25. A method according to claim 24 wherein said activating analog probe forms a hybridization complex with some portion of said nucleic acid target sequence.

26. A method according to claim 25 wherein said hybridization complex is at least as stable as a non-analog nucleic acid hybridization complex.

27. A method according to claim 12 wherein said analog probe comprises peptide nucleic acid.

28. A method according to claim 12 wherein said recombinase is a species of a prokaryotic recombinase.

29. A method according to claim 28 wherein said prokaryotic recombinase is a RecA recombinase.

30. A method according to claim 12 wherein said recombinase is a species of eukaryotic recombinase.

31. A method according to claim 30 wherein said recombinase is a Rad51 recombinase.

32. A method according to claim 30 wherein said recombinase is a complex of recombinase proteins.

33. A method according to claim 13 wherein at least one of said first and second probes comprises a purification tag, and said method further comprises separating said probes and said target sequence from said sample using said tag.

34. A method according to claim 33 further comprising inserting the nucleic acid target sequence into a cloning vector.

35. A method according to claim 33 wherein said purification tag comprises biotin.